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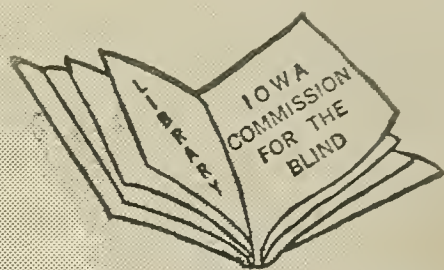
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*Edwin Rohde*

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# CATARACT



Focus on Research



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# CATARACT



## Focus on Research

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National Eye Institute

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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# What is a Cataract?

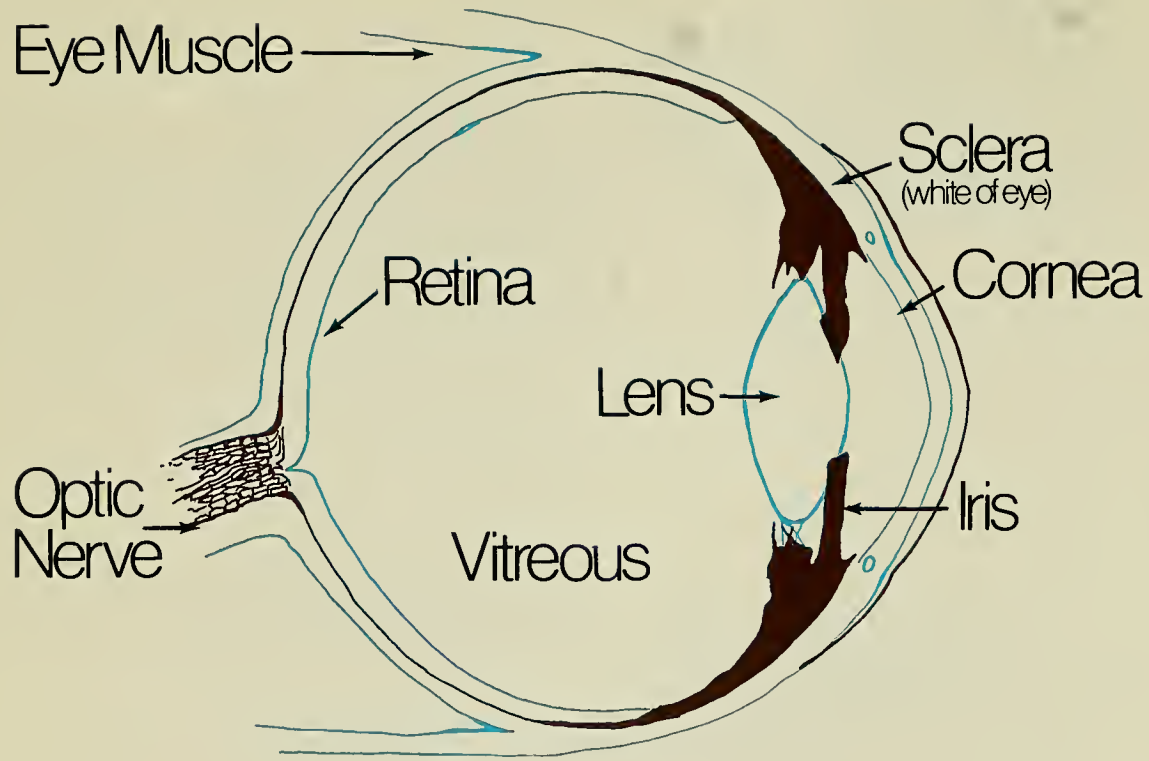
*A cloudiness or opacity in the lens of the eye which interferes with vision is called a cataract.* The normally transparent lens is located behind the colored iris and in front of the jelly-like vitreous which fills the center of the eye. The lens helps focus images onto the retina which transmits them to the brain. If the lens becomes clouded with a cataract, the passage of light is obstructed and vision is impaired.

Cataracts may develop over a period of years or within only a few months.

*A cataract is not a film or membrane that grows over the eye.*

Cataracts range from very minute opacities which cause little interference with vision to large, dense areas of cloudiness causing marked loss of vision.

*A cataract is a cloudiness or opacity in the lens which interferes with vision.*





# What Causes Cataracts?

*Cataracts occur when there is a change in the chemical composition of the lens.*

In most cases the cause of a cataract cannot be determined. *It is known, however, that cataracts occur when there is a change in the chemical composition of the lens.*

The most common form of cataract is related to normal aging of the eye. This is sometimes referred to as a *senile cataract*. The lens, which is composed of cells that form transparent protein fibers, continues to grow slowly throughout life. Over a period of time, the fibers can become more compacted in the center of the lens and begin to lose their transparency.

Cataracts can also be associated with infection, inflammation, and injury as well as genetic, metabolic, and chemical influences.

In general, cataracts are classified as *senile*—those associated with aging, *congenital*—those which are hereditary or occur at birth, *traumatic*—those associated with injury, or *secondary*—those which occur following other eye diseases.

# Symptoms

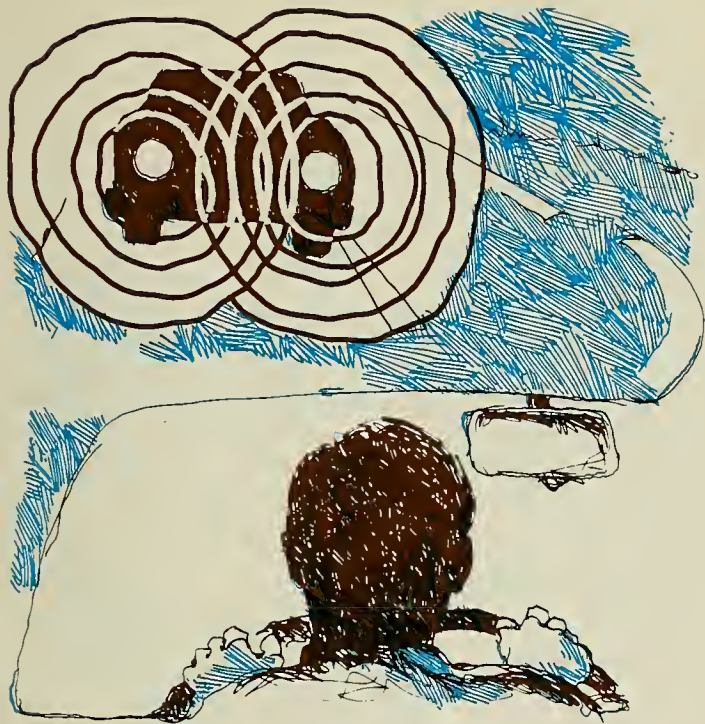
Acquired cataracts—those which result from aging, chemicals, disease, injury, and inflammation—usually develop gradually. *Neither inflammation nor pain accompanies the development of the cataract itself.*

Hazy vision is a common sign of cataract. Double vision in one eye sometimes occurs, but this usually disappears as vision decreases.

Cataracts frequently cause difficulty with night driving because light from oncoming headlights is scattered by the opacity in the lens, causing a dazzling sensation.

For patients with a nuclear cataract—one in the central portion of the lens—vision is generally better in dim light when the pupil is dilated. If the cataract develops in the outlying area of the lens, vision is usually better in bright light. Fixed spots interfering with vision sometimes accompany cataract development.

*Neither inflammation nor  
pain accompanies the  
development of a cataract.*



Frequent change of eyeglass prescriptions may be necessary in early stages of cataract development. But, as the opacity becomes denser, eyeglass changes are no longer helpful. Patients with nuclear cataracts often discover they are able to read books and newspapers again without glasses. This is because the developing cataract temporarily increases the power of the lens to bend light rays to focus on the retina. *But this "second sight" is gradually lost as vision deteriorates.*

While most congenital cataracts are hereditary, this is not always the case. Cataracts present at birth may be associated with other diseases of the eye and body. Approximately 20 percent of all congenital cataracts are associated with rubella (German measles) infection during the early months of pregnancy. Some types of hereditary cataracts do not appear until months or even years after birth.

# Treatment

*At present, surgery is the only method for treating cataracts.* There is no medical treatment available that will dissolve the opacity or prevent its development and progression.

Surgery is suggested when the cataract interferes with a person's visual needs. This is, of course, an individual matter and must be decided by the patient and his doctor. Surgery may also be advised if, in the doctor's judgment, the cataract may lead to other eye complications.

*From 90 to 95 percent of all cataract operations are successful.*

In most cases surgery is postponed until vision in both eyes becomes impaired. This is because of the difference in visual perception between operated and unoperated eyes.

*From 90 to 95 percent of all cataract operations are successful.*



Surgery may be performed on only one eye when a mature cataract threatens to damage the eye.

*It is no longer considered necessary to wait until a cataract is "ripe"—that is, totally opaque—to perform surgery.*

At one time this was common practice. However, cataract operations can now be performed successfully even when the patient still maintains a fair amount of vision.

*The general health of the patient is also an important consideration.* Conditions such as hypertension (high blood pressure), diabetes, and chronic illness may affect recovery. The patient should inform his doctor of any health problems or any known reaction to sedatives or anesthetics.



# Surgical Methods

Cataract extraction can be performed with either a general or local anesthetic. Prior to surgery medications to prevent nausea and induce drowsiness are administered. Eye drops to cleanse and numb the eyes are also used. *By the time the operation begins, the patient is relaxed and comfortable.* Most patients usually feel no discomfort during surgery.

Generally, the operation lasts less than an hour. A small incision is made at the outer edge of the cornea—the transparent front portion of the eye. The lens is then removed, and the incision is closed with small sutures. In some cases the sutures have to be removed; in other instances they dissolve in approximately two to three weeks.

Two methods commonly used for cataract surgery are intracapsular extraction and extracapsular extraction.

Intracapsular extraction is usually performed for senile cataracts. Rarely is it used for patients under 30 years of age. With this method, the entire lens and its capsule are removed. In extracapsular extraction a large portion of the front lens capsule and the nucleus are removed; the back portion of the lens capsule is left intact.

*By the time the operation begins,  
the patient is relaxed and comfortable.*



Variations of extracapsular extraction have been developed for congenital cataract surgery. One of these is aspiration. In this procedure the lens capsule is opened and the soft lens nucleus is removed by suction through a hollow needle. This single procedure removes most of the lens, usually leaving the back portion of the capsule and vitreous (the clear, jelly-like material which fills the center cavity of the eye) intact. Complications rarely follow. Such a procedure avoids the repeated operations necessary with other techniques of congenital cataract extraction. In addition, the small incision used in this procedure allows the eye to heal more quickly, thus shortening the period of hospitalization.

The aspiration technique has also been used successfully in young patients with traumatic, rubella, and secondary cataracts.

Surgery for congenital cataracts in an infant is usually not performed until six months of age. If severe eye disease accompanies the cataract, surgery may be postponed until a later date.

# Improvements of Surgical Techniques

*During the past decade  
many technical improvements  
have made cataract surgery  
safer and more satisfactory.*

*During the past decade many technical improvements have made cataract surgery safer and more satisfactory, such as advancements in suture techniques, improved instrumentation, and operation under microscopic control.*

An enzyme is now being used by some ophthalmic surgeons to weaken the ligaments holding the cataract in place, thus removing the need for the cataract to ripen or for the opacity to increase in size. The cataract is then removed by grasping it with special forceps or a suction cup.

Another technique recently developed employs a very cold probe. In this method, cryo-extraction, the lens is frozen, and the probe adheres to it. This produces a firm connection, and the cataract can be lifted easily from the eye.

The aspiration method used to remove congenital cataracts is not suitable for the removal of cataracts in elderly

patients because of the relative hardness of the lens which occurs with aging. In an effort to extend the aspiration technique to older cataract patients, an experimental technique employing ultrasound is currently being used. In this procedure, called phakoemulsification, the surgeon inserts a hollow needle through a small incision in the white of the eye into the cataractous lens. The high frequency sound vibrations soften and liquify the cataract so it can be drawn out by suction through the hollow needle. Because this technique involves a smaller incision, the eye can heal more quickly.

However, the ultrasonic method is not yet as successful as conventional techniques in treating the elderly who constitute the majority of cataract patients. It is more suitable for children and young adults because their lenses are relatively softer.



# Adjustments After Surgery

After cataract surgery some visual adjustment must be made. This is particularly true when surgery is performed on only one eye at a time. Following surgery, a temporary powerful eyeglass is prescribed to replace the natural lens removed from the eye. With glasses there is a 20 to 35 percent increase in the size of all objects because the glasses act as a magnifying glass. If only one eye has been operated upon and there is some vision in the other eye, the difference in the size of the images formed by the two eyes cannot be properly fused by the brain. Either one eye or the other must be used alone until the second cataract is removed. Approximately six weeks after surgery, permanent eyeglasses can be fitted.

Even with both cataracts removed, distances may be misinterpreted and dizziness and nausea may be felt when the cataract glasses are first worn. These problems can be overcome if the patient learns to hold his eyes straight, look through the center of his glasses, and turn his head instead of his eyes to regard objects to the side or to read.

An alternative is to wear contact lenses which only enlarge the image about six percent. The contact lens is especially helpful following cataract extraction in one eye because the image difference between the two eyes is small and can

*Cataract patients can watch television,  
read, and walk about freely  
without fear of rupturing the stitches.*



usually be tolerated by the brain. Eyeglasses with a mild prescription will still be necessary for near reading since the contact lens only corrects for far vision.

Most patients are able to resume their usual activities within a short time after cataract surgery. Technical improvements in suturing have greatly reduced the chances of a cough or sneeze rupturing the stitches. Cataract patients can also watch television, read, and walk about freely without fear of damaging the sutures.

*Special care, however, should be taken during the early stages of recuperation to avoid any strenuous physical activity or over-exertion that would cause the face to flush.* This includes lifting heavy objects or moving furniture. Patients should also refrain from bending their head far forward. All of these activities increase the pressure in the area of the eye and may cause hemorrhaging.

Rubbing and putting a finger in the eye may also cause hemorrhaging. Doctors often advise their patients to wear a protective mask during sleep for about a month after surgery to prevent these accidents.

Even these precautionary limitations will usually be lifted in six to eight weeks following surgery.



# Research

While improvements have been made in the surgical treatment of cataracts, there still remains a great need to understand better the cause of cataract development. Investigations are being conducted in this country and abroad to learn more about what causes cataracts and how to improve their treatment.

*The National Eye Institute has primary responsibility within the National Institutes of Health to conduct and support research on the cause, natural history, prevention, diagnosis, and treatment of disorders of the eye and visual system.* The Institute is supporting a number of studies relating to cataracts.

Researchers supported by grants from the National Eye Institute are conducting investigations to predict how well a person with a dense cataract will see after cataract surgery even before such surgery has actually been performed. One recent development is a method for improving the sensitivity of a test which measures the electrical activity in the brain occurring during vision. This system may make it possible to determine whether or not the retina is normal, even if a cataract is present.

*Through research it is possible  
that medical treatment of cataracts  
may some day be possible.*



A researcher at the National Eye Institute recently was able to block the formation of sugar cataracts in rats for the first time. This type of cataract is responsible for blinding babies who suffer from galactosemia, a rare hereditary disorder causing poor weight gain and malnutrition.

Surgery for congenital cataracts—usually postponed until six months of age—is now being recommended by some NEI-supported researchers as early in life as the cataract is diagnosed. Their research showed that the aspiration method for cataract extraction was effective for the infants in their study when followed by immediate correction of vision with contact lenses.

The National Eye Institute also supports research aimed at preventing cataracts which result from medication and radiation.

Much remains to be done. But through research it is possible that non-surgical treatment of cataracts may some day be possible.

# Resistance to Surgery

Cataract extraction is one of the most successful surgical operations performed today. Yet, this surgery is often unnecessarily feared. Many cataract patients are afraid of pain or that the surgery itself will cause permanent blindness. Others doubt that the operation will restore vision. Elderly patients may fear hospitalization, and patients of all ages may refuse to accept the fact that they are losing their sight.

As the third leading cause of blindness in the country, cataract claims the sight of more than 5,000 people every year. However, such loss is usually needless. Unless there is some other condition which interferes with vision, surgical removal of a cataract should permit restoration of sight.

*It must be emphasized that cataract surgery is very successful. From 90 to 95 percent of patients undergoing this operation enjoy a restoration of sight. Hundreds of successful operations are performed every month.*

*Cataract surgery is very successful.  
From 90 to 95 percent of patients  
undergoing this operation  
enjoy a restoration of sight.*



Anesthetics, medications to prevent nausea and induce drowsiness, and eye drops to cleanse and numb the eyes make the patient relaxed and comfortable by the time the cataract operation begins. The patient feels no pain during surgery and usually nothing more than a dull ache for a few days afterwards. This can be alleviated with aspirin. In addition, recent advancements in suture techniques, improved instrumentation, operation under microscopic control, and other technical improvements have made cataract surgery very safe and the outcome satisfactory.

Following surgery, patients who take their medication regularly, refrain from strenuous physical activity and over-exertion, and follow their doctors' orders, have an excellent chance of regaining their sight with no complications. Cataract surgery need not be feared. Rather, it should be regarded as an opportunity to regain lost sight.



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